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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/087,154	03/01/2002	John R. Frus	215972	3815
23460	7590	07/01/2005	EXAMINER	
LEYDIG VOIT & MAYER, LTD TWO PRUDENTIAL PLAZA, SUITE 4900 180 NORTH STETSON AVENUE CHICAGO, IL 60601-6780			PHILOGENE, HAISA	
			ART UNIT	PAPER NUMBER
			2828	

DATE MAILED: 07/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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<b>Office Action Summary</b>	Application No. 10/087,154	Applicant(s) FRUS ET AL.	
	Examiner Haissa Philogene	Art Unit 2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 2/4/04 & 3/5/04.  
 2a) ☐ This action is FINAL.                      2b) ☒ This action is non-final.  
 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1 and 74-100 is/are pending in the application.  
     4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) ☒ Claim(s) 97-100 is/are allowed.  
 6) ☒ Claim(s) 1,75-80,82-87,90 and 92-96 is/are rejected.  
 7) ☒ Claim(s) 74,81,88,89 and 91 is/are objected to.  
 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
 10) ☒ The drawing(s) filed on 01 March 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☐ All    b) ☐ Some \*    c) ☐ None of:  
         1. ☐ Certified copies of the priority documents have been received.  
         2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
         3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
     \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Drawings*

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "...at substantially the same time" (claim 74); the "...substantially at the same time....substantially overlaps...(claims 97 and 98); the ...at substantially the same time...(claim 99); the "shape of the spark plume" (claim 90) must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 75-78, 82-87, 90 and 92-96 are rejected under 35 U.S.C. 102(b) as being anticipated by Hamai et al., Patent No. 4,502,454.

As per claims 1 and 75-77, Hamai discloses in Fig.9 an apparatus for controllably generating sparks at a spark generating device (9), the apparatus comprising, in combination:

at least two output stages (items 145-148 in the ignition unit 112) for connecting to the spark-generating device or igniter plug (9), each of the output stages(145-148)

including: (1) an energy storage device or capacitor (146) to store energy; (2) a controlled switch (145), when turned ON, for selectively discharging the energy storage device (146); and (3) a network (5, 175) for transferring the energy discharged by the energy storage device (146) to the spark generating device (9);

means (113, 147) for charging the energy storage devices and at least partially isolating the energy storage device of each output stage from the energy storage devices of the other output stages; and,

a logic circuit (111, 32, 33) connected to the controlled switches (145) of the at least two output stages for selectively triggering the output stages, by turning ON the controlled

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switches or thyristors (145) being solid-state switches, to transfer their stored energy, in capacitors 146, to the spark generating device (9) to generate a spark (See also Col.9, lines 26-45).

As per claim 78, Hamai discloses that each of the at least two output stages further includes a triggering circuit (33) coupled to the controlled switch (145) and to the logic circuit (111, 32) for triggering the controlled switch (145) in response to a control signal (e) from the logic circuit (111) via distributing unit (32).

As per claims 82 and 83, Hamai discloses that each of the networks of the at least two output stages includes a diode (147) to at least partially isolate each of the at least two output stages from the other output stages (145-148), wherein the isolating circuit comprises at least two isolating diodes(147), each of the isolating diodes being associated with one of the at least two output stages (145-148).

As per claims 84-87, Hamai discloses that the means (113) comprises at least one controlled switch (127) for selectively connecting the output stages to a source of energy (4) assuming that ignition switch (15) is closed, wherein the means (113) further comprises a DC-DC converter (see Fig.4) for boosting the source of energy (4) capable of therefore being a well-known flyback converter for selectively providing energy to the output stages, and wherein the flyback converter (113) includes at least one input (n or 128, 129) for switching the converter between charge and stop states for controlling the charging of the energy storage devices (146), and wherein the means (113) disconnects the output stages from the energy source upon receiving said at least one input (n or

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128, 129) at least while the energy storage devices (146) are discharging (see Col.10, lines 15-18).

As per claim 90, Hamai discloses in Fig.9 an apparatus for controllably generating sparks at a spark generating device (9), the apparatus comprising:

at least first and second capacitors (146) to store and selectively discharge energy;

first and second controlled switches (145) connected to the first and second capacitors, respectively, to discharge the energy stored in the first and second capacitors to an input of the spark-generating device (9) through network (5, 175) in response to control signals (l, k);

a circuit (113, 147) for charging the capacitors and for at least partially isolating each capacitor from the other capacitors such that any one of the capacitors can be discharged without discharging the others; and,

a logic circuit (111, 32, 33) for providing the control signals (l, k) to the controlled switches (145) to discharge the capacitors (146) to the input of the spark-generating device (9) through network (5, 175), wherein the logic circuit triggers the controlled switch (145) to inherently shape the plume of the spark generated by the spark generating device (9) as the device receives a voltage  $V_2$  with a plume waveshape (see Fig.13).

As per claims 92-96, Hamai discloses that the circuit for charging and isolating comprises a diode (147) associated with each of the capacitors (146) and a charging circuit (113) for charging each of the capacitors (146) via one of the diodes (147).

93. (new) The apparatus of claim 92 wherein the charging circuit (113) comprises at least one converter which is a DC-DC converter (see Fig.4), that the controlled switches are thyristors or solid-state devices (145), that the capacitors (146) are capable to have different capacitances based on the proportionality of the capacitor and the ignition energy; the ignition energy being controlled to an appropriate value for each cylinder (see Col.10, lines 44-51), and the logic circuit comprises a microprocessor (28).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 79 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hamai et al in view of Frus et al., Patent No. 5,245,252.

Hamai discloses the claimed invention substantially as explained above. Further, Hamai discloses that at least one of the networks of the at least two output stages comprises an inductor (5) that passes current when the controlled switch(145) becomes conductive such that the current passes through both the inductor (5) and the spark generating device (9). Hamai does not disclose a diode to ensure nominally unidirectional current flow through the spark generating device. Frus discloses in Fig.1 an apparatus for controllably generating sparks at a spark generating device (21) having a freewheeling or unidirectional diode (29) to ensure nominally unidirectional current flow through the spark generating device (21). It would have been obvious to a person

having ordinary skill in the art at the time the invention was made to employ the diode as taught by Frus into the Hamai type apparatus, because it would ensure a prevention of oscillation which results in a unipolar discharge current.

Claim 80 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hamai et al in view of Michalek et al., Patent No. 5,446,348.

Hamai discloses the claimed invention substantially as explained above. Further, Hamai discloses that at least one of the networks of the at least two output stages comprises an inductor (5) that passes current to and from the spark generating device (9). Hamai does not disclose a diode permitting reverse current flow during bipolar discharge. Michalek discloses an apparatus for controllably generating sparks at a spark generating device (32, 33) having a diode (46) that permits reverse current flow during bipolar discharge (see Figs. 3 and 4). It would have been obvious to a person having ordinary skill in the art at the time the invention was made to employ the diode as taught By Michalek into the Hamai type apparatus, because it would ensure a carrying of a reverse current that flows through the solid state switch.

#### ***Allowable Subject Matter***

Claims 74, 81, 88, 89 and 91 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 97-100 are allowed.



### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Frus et al., Patent No. 6,353,293 ; Frus et al., Patent No. 6,034,483.

### ***Correspondence***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Haissa Philogene whose telephone number is (571) 272-1827. The examiner can normally be reached on 6:30 A.M.-6:00 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, MinSun Harvey can be reached on (571)272-1834. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

hp

Haissa Philogene  
Primary Examiner  
AU. 2828  
